September WPIC Meeting
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Implications of Fill Placement in Rivers and Streams

# Wetland Fill

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. The US loses about 60,000 acres of wetlands each year. Montana has lost approximately one-third of its naturally occurring wetlands since settlement.

There are several consequences of wetland fill, including:

1. ***Direct loss of limited habitat:*** Wetland habitats are often considered "keystone' habitats in that their relatively small spatial extent provides significant environmental benefits to a much greater area. Wetlands make up as little of 0.5% of the land cover in Montana, although 196 terrestrial species are considered riparian or wetland habitat obligates. Two-thirds of the 10 million to 12 million waterfowl of the continental United States reproduce in the prairie pothole wetlands of the Midwest.

Big Hole Watershed Committee

2. ***Loss of water storage features:*** Wetlands and riparian areas can store up to three acre-feet of floodwater per wetland acre

3. ***Lost natural water quality treatment*** Wetlands protect water quality by trapping sediments and retaining excess nutrients and other pollutants such as heavy metals. These functions are especially important when a wetland is connected to groundwater or surface water sources (such as rivers and lakes) that are in turn used by humans for drinking, swimming, fishing, or other activities. These same functions are also critical for the fish and other wildlife that inhabit these waters.

The ***Big Hole Watershed Committee*** was selected by Montana DEQ and Montana Wetlands Legacy Project for a pilot program to incorporate wetlands into watershed restoration planning, specifically to improve water quality.

WATER POLICY INTERIM
COMMITTEE 2015-16

September 3, 2015 Exhibit 5

**"Wetlands perform a dazzling array of ecological functions that we have only recently begun to appreciate"** (Washington State Department of Ecology).

# Wetland Fill and the Musselshell River

From near Harlowton to Fort Peck Reservoir, 59 avulsions occurred on the Musselshell River in the spring of 2011, abandoning a total of 39 miles of channel. The abandoned channel segments range in length from 280 feet to almost three miles, creating extensive oxbow wetlands.

Best Management Practices were developed for these abandoned channels, including recommendations to preserve them as wetlands. When abandoned channels are left to naturally evolve, they contribute postively to numerous ecological processes in the river corridor. Benefits derived from perserving floodplain oxbow features include improved water quality, water quantity, flood protections, and habitat.

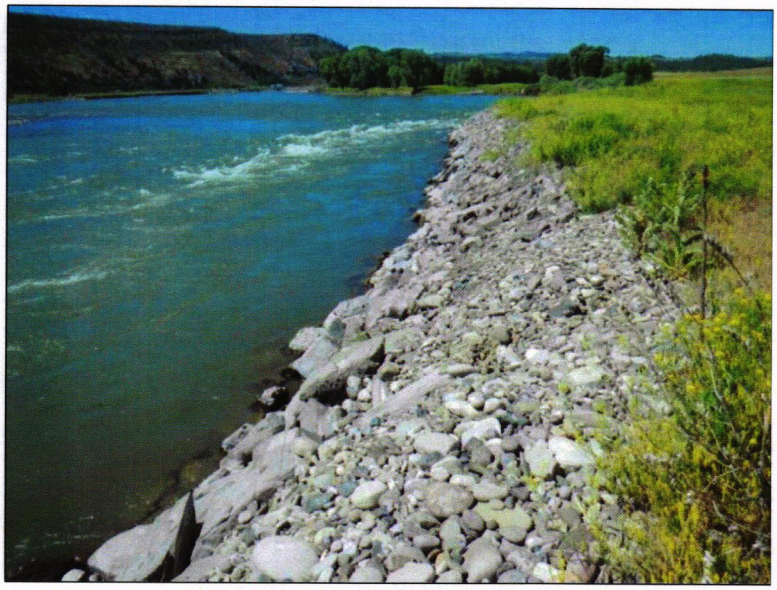
a. ***Water Quality:*** Oxbows have been identified as providing important functions including sediment storage, pollutant absorption and nutrient cycling.
b. ***Water Quantity:*** One concern expressed by water users in the basin is that because the Musselsell River is currently steeper and shorter than before the flood, there is a tendency for water to pass through the basin faster than before. If oxbows remain connected to the stream channel, they can help mitigate this process, and also increase rates and volumes of surface and groundwater recharge later into the summer and fall.
c. ***Flood Protections:*** Several producers in the basin have noted that flooded fields were less impacted if they were protected by wetland swales that captured sediment and debris. These features can act as a "strainer" during floods that trap potentially damaging sediment and woody debris. Oxbow wetlands also provide flood retention, storing water to reduce flood discharges downstream and prolong streamflow.

d. ***Habitat:*** Oxbow environments are currently being actively restored across the US to improve habitat for waterfowl, fisheries, and other wildlife. These habitats are considered unique in river systems, providing spawning and nursery habitat for fish, and high water tables that promote riparian growth and sustain wildlife habitat.

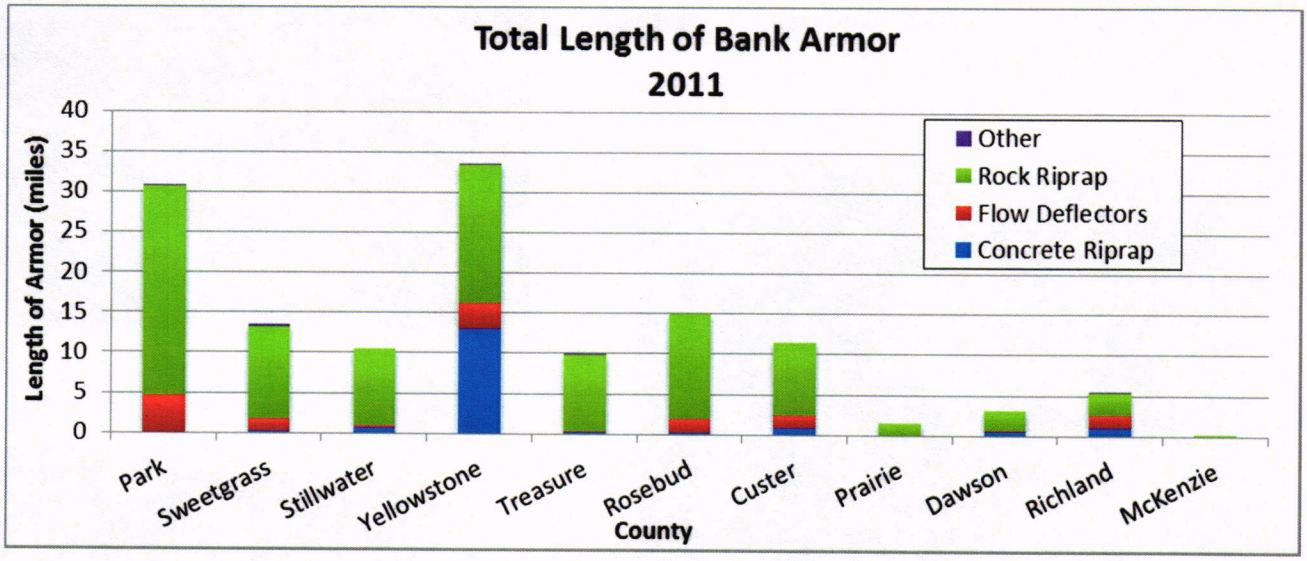
# Rivers and Streams: Impacts of Fill

## Yellowstone River Bank Armor

There are about 136 miles of bank armor on the Yellowstone River below Gardiner, including rock riprap, flow deflectors, concrete riprap, car bodies, and minor extents of other techniques such as gabions and steel retaining walls. Rock riprap constitutes about 75 percent of the total armor. The main land uses that are protected by bank armor are agriculture and the active rail line, which collectively account for 73 percent of the total armor. The third most common use of bank armor is in urban/exurban areas.



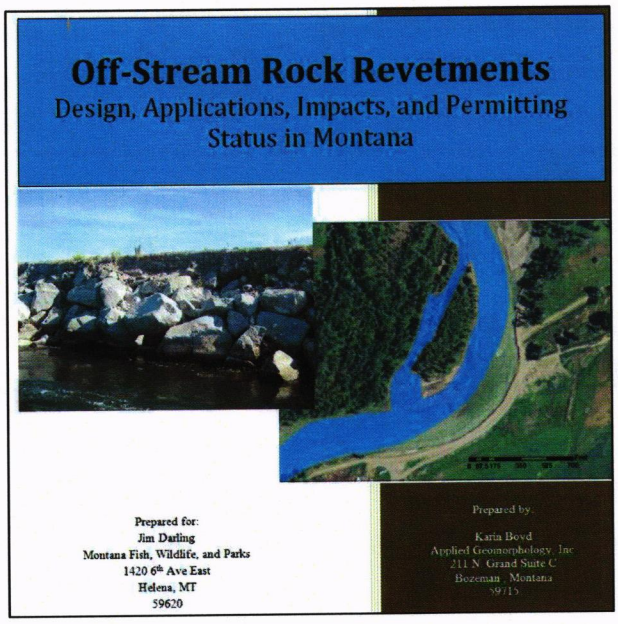
Between 2001 and 2011, about 13 miles of armor were constructed on the Yellowstone River.



There are several consequences of bank armoring, including:

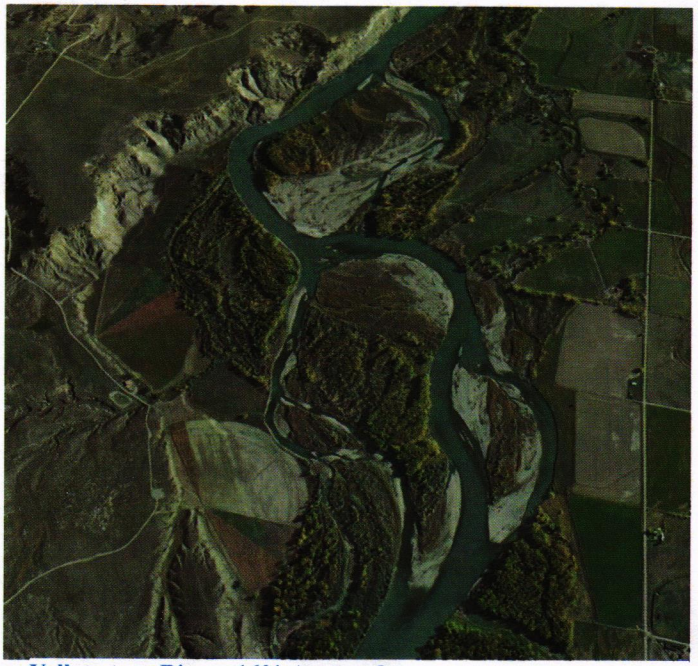
1. ***Armor Failure:*** Between 2001 and 2011, at least four miles of bank armor were completely flanked on the Yellowstone River. This has resulted in the abandonment of bank armor material (large rock and concrete rubble) out in the channel. Flanked armor commonly causes dramatically accelerated erosion behind the rock structures, and creates navigational hazards.

2. ***Trenched Armor Failure:*** Trenched riprap has become more popular in recent years, in many cases because it does not yet require permitting. Many trenched armor projects have failed due to their poor construction techniques.



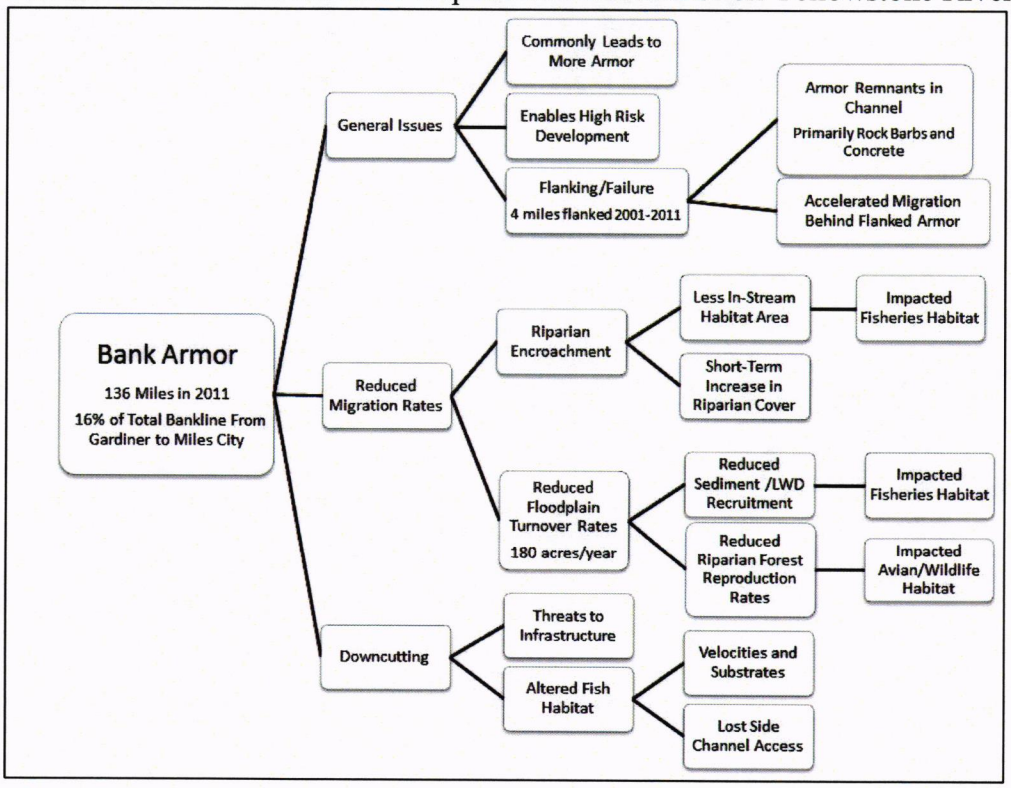

3. ***Locking our rivers in place:***
By design, bank armor "tames" rivers. This has major implications for river function, including maintaining riparian forest and sustaining healthy fish habitat. This in turn has implications for ESA listings and associated landowner challenges.

Sacramento River ~95% Armored



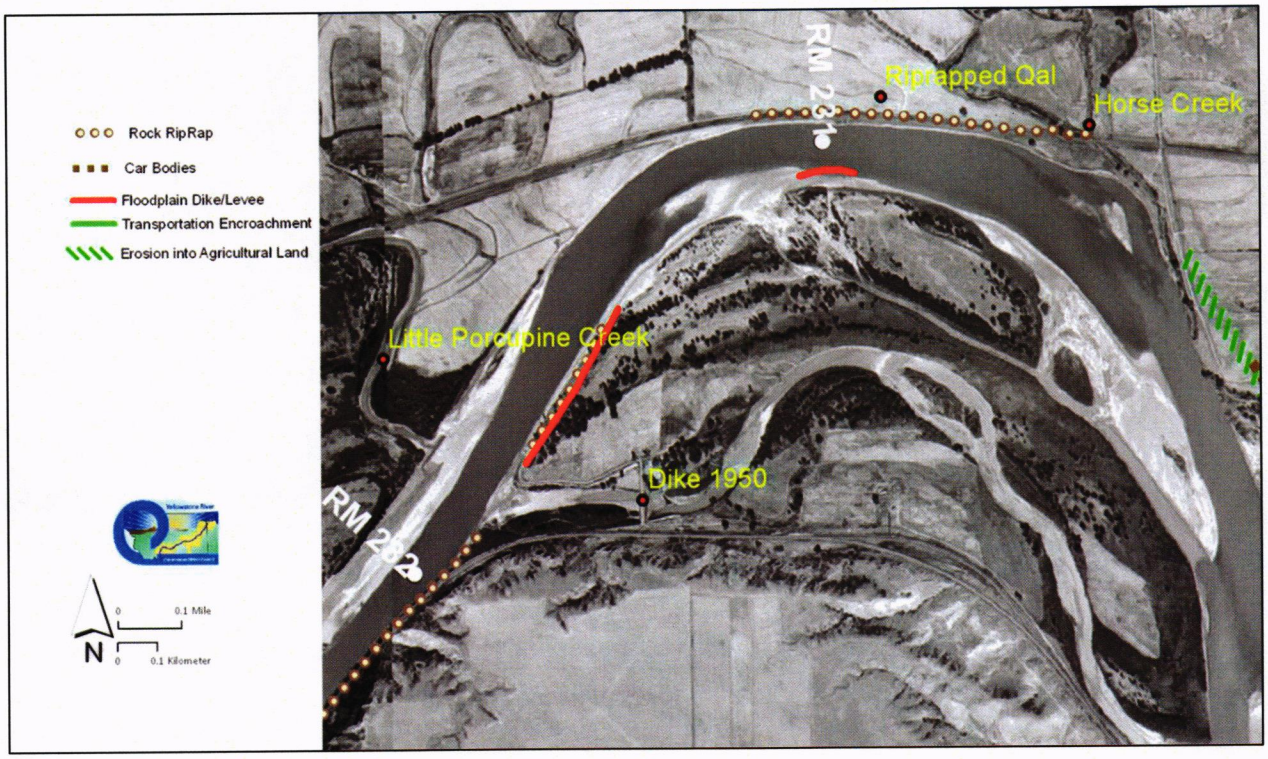
Yellowstone River ~16% Armored

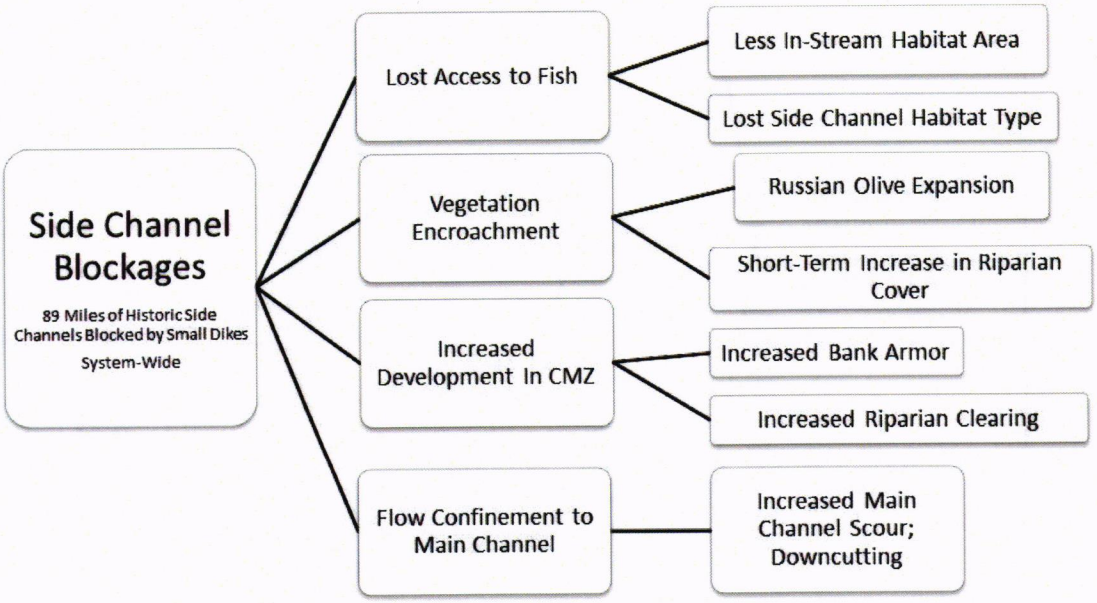
4. Yellowstone Schematic: Cumulative Impacts of Bank Armor on Yellowstone River



# Side Channel Blockages

Numerous small-scale floodplain dikes have cumulatively blocked approximately 89 miles of side-channels on the Yellowstone River. About 42 miles of side channel had been blocked by 1950, and another 47 miles have been blocked since. Side channels have been identified as important habitat for Yellowstone River fish, including those identified as Species of Concern.




"CMZ" refers to the Channel Migration Zone